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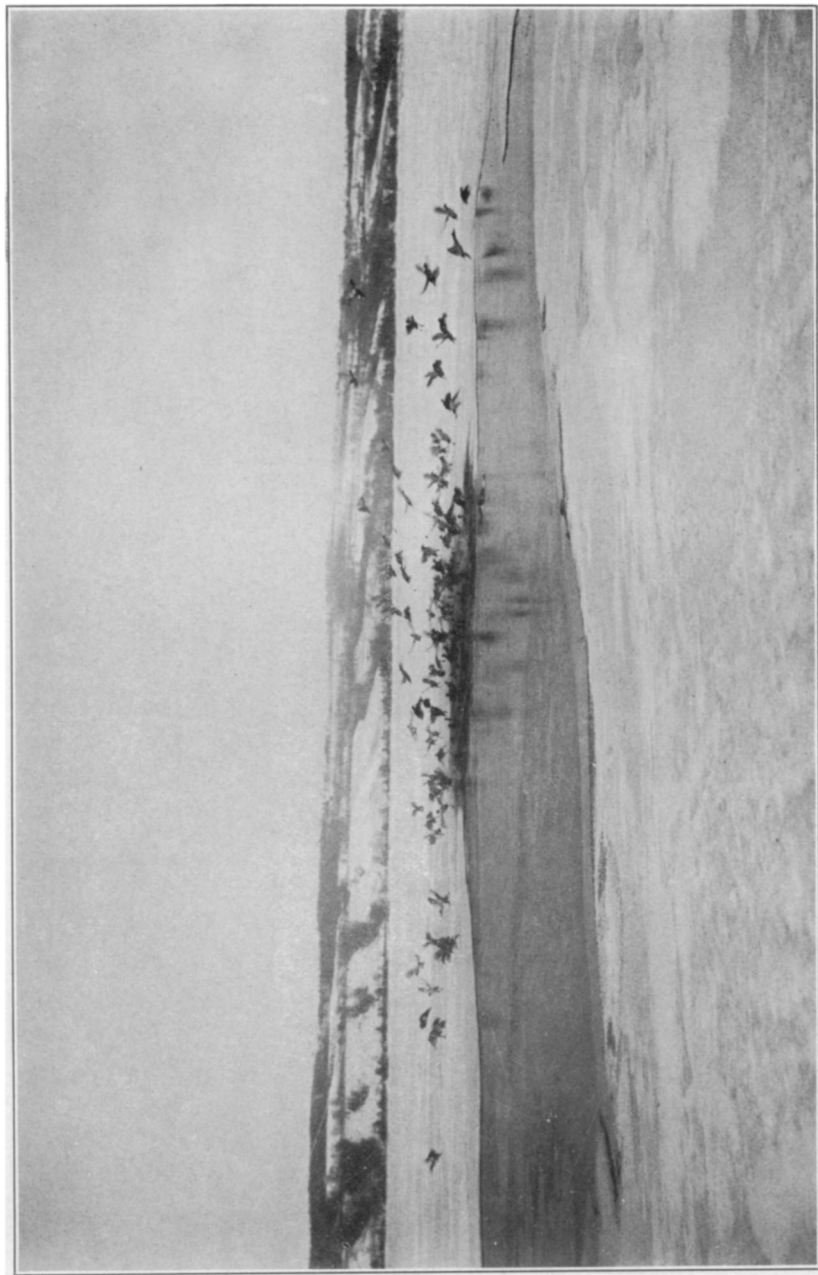
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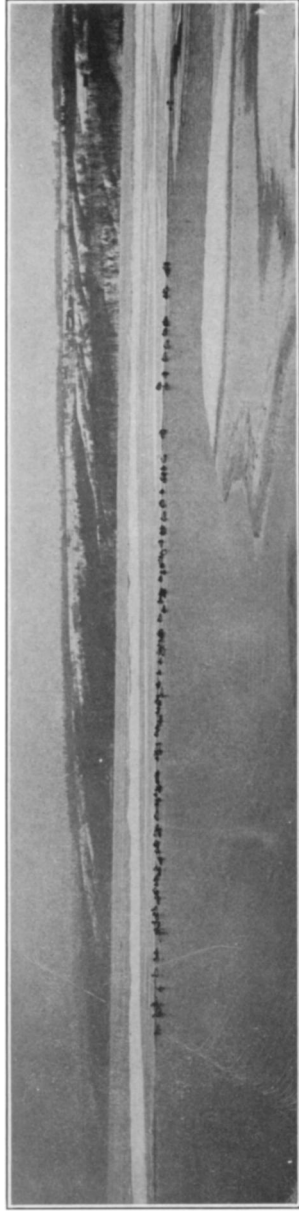
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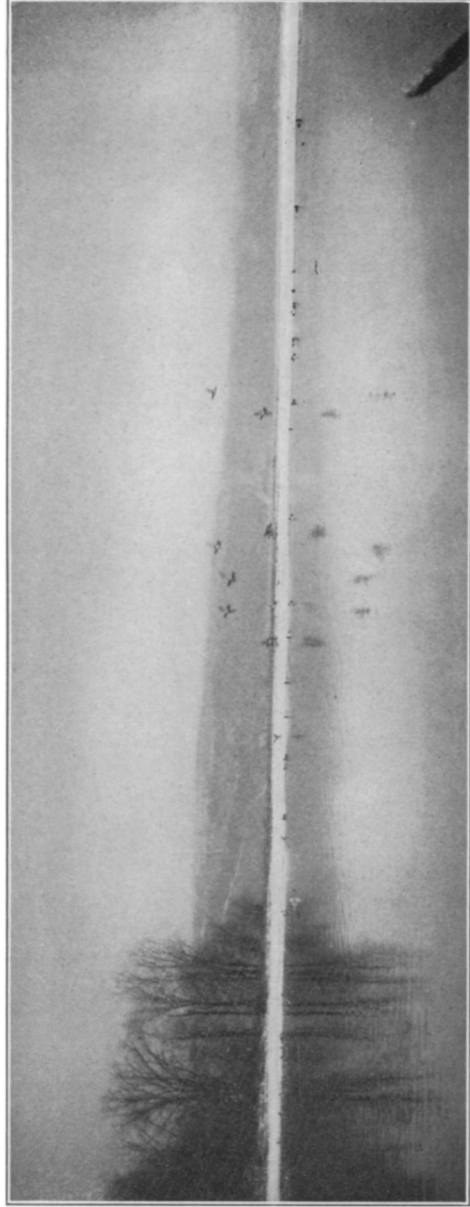
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CANVAS-BACKS AND SCAUP DUCKS RISING FROM THE WATER.



1. THE FLOCK AT REST.



2. SCAUP DUCKS CIRCLING.

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THE FREEZING OF CAYUGA LAKE IN ITS RELATION TO BIRD LIFE.

BY ALVIN R. CAHN.

CAYUGA is the largest of seven, nearly parallel lakes which lie in the central portion of New York State. They all extend in a north and south direction, and either directly or indirectly connect at the northern end with Seneca River. Numerous streams are tributary to Cayuga at the south end; the two principal ones are Fall Creek and the Inlet, both of which proved to be important in their relations to bird life, since they furnished open water throughout the period during which the lake was frozen.

The conditions necessary for the complete surface freezing of Cayuga Lake are intensely cold weather, and absolutely quiet atmospheric conditions for a prolonged period. As Cayuga Lake is forty miles long, with a surface area of 66.8 square miles, and situated as it is in a trough between wind-swept hills, it is very seldom indeed that the above conditions prevail for a sufficient length of time to permit the complete closing of the lake. In the present instance, the freezing was preceded by six weeks of extremely cold weather, the temperature dropping as low as sixteen degrees below zero, and the entire period accompanied by high north and northwest winds. Freezing would have occurred earlier than it did except for the continued strong winds. When these abated, the lake froze over entirely during a single night.

There seems to be a tradition that Cayuga Lake closes every twenty years, some basis for which appears in the dates of complete freezing. They are: 1796, 1816, 1836, 1856, 1875, 1884 and 1904. The first two dates are approximated,¹ but for the year 1836 we find records showing the lake to have been covered by a thin coating of ice for a day or two;² in 1856 the lake was frozen sufficiently to allow teams to cross.³ A similar hard freezing occurred in 1875,⁴ and in 1884 the lake froze over on February 15, and remained in this state until April 4. I am told by several persons in Ithaca that similar conditions obtained for a short time in 1895, but I am assured on very good authority that at no time was it completely closed, there existing an area of several square miles which remained open. In 1904 the surface froze completely about the middle of February,⁵ but remained so for a short time only.

It seems evident that this condition of the lake bears a very important relation to bird life, particularly to those species which depend upon the open water for subsistence. So long as a few square miles or even a smaller area remain open, wherein the birds may feed, the effect of the freezing is lost. For this reason, as far as the birds are concerned, the freezing of 1895 may be eliminated. Again, the duration of the frozen period bears an important relation to the bird life, and it is to be regretted that there are no records of ornithological observations for the extremely long period occurring in 1884.

As previously stated, six weeks of excessive cold preceded the freezing during the winter of 1912. Ice twenty-two to twenty-four inches thick formed in the shallows at both ends of the lake, and as the cold weather continued, the frozen area extended outward little by little. During the afternoon and night of February 10, the wind fell, and the morning of the 11th found Cayuga Lake frozen from end to end. On the 12th I made my first visit to the lake about Ithaca to investigate conditions. The air was alive

¹ Reed, H. D., & Wright, A. H. "The Vertebrate Fauna of the Cayuga Lake Basin, N. Y." *Proc. Amer. Phil. Soc.* Vol. XLVIII No. 193, 1909, p. 372.

² *Ithaca Daily Chronicle*, Dec. 22, 1846, Vol. 1, No. 140.

³ *Ithaca Weekly Journal*, March 12, 1856.

⁴ *Ithaca Daily Journal*, March 3, 1875.

⁵ *Ithaca Daily Journal*, Feb. 16, 1904.



1. CANVAS-BACKS FLYING OVERHEAD.



2. CANVAS-BACKS AT REST.

with ducks; flock followed flock, in one continuous stream, all flying southward. I am told by Mr. Vann that even more went by on the 11th than on the 12th. By the morning of the 13th the southerly migration had almost ceased, but there were great numbers at rest upon the ice, and from this time on dead birds were found regularly. Large numbers of ducks sought the open, flowing spots of Fall Creek and the Inlet. While there was a little open water here, there was no food, and the majority very soon left. At Ludlowville, about seven miles down the eastern shore, there was a single spot where a spring fed into the lake, forming an open area about thirty yards square, which soon became the rendezvous of all the ducks within a radius of many miles.

Here, a successful attempt was made to feed them. A week after the freezing over of the lake, this pool was black with ducks; so great had their numbers become that free movement was out of the question. It seemed as if there was not room for another individual. Gradually, however, this crowd decreased, the stronger ones leaving for the south continually. From February 23 to March 3, there were not more than three hundred there. Five species were represented in this flock: Bluebill, Canvas-back, Golden-eye, Black Duck and Buffle-head. The Black Ducks were the most wary—the Canvas-backs the least so. It was a rare sensation indeed to be surrounded by flying hundreds of wild ducks, wheeling and flapping within fifty feet of one's head.

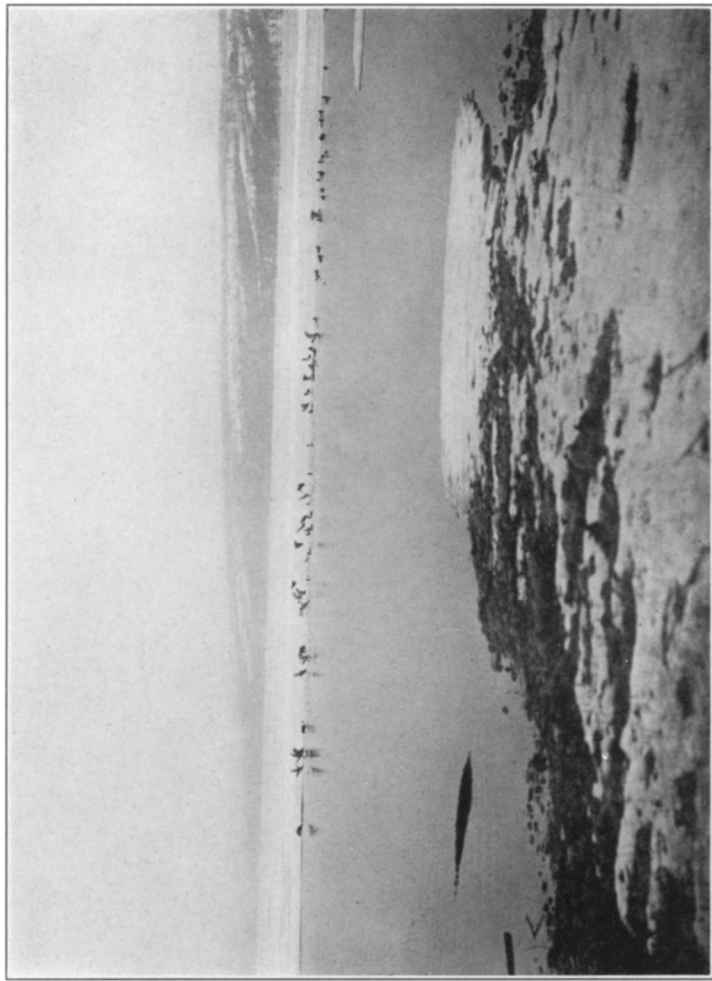
In the following paragraphs will be discussed the various species of water birds found from February 10 to March 3, within the area between Ludlowville and Ithaca, including the conditions in which the birds were found, the numbers of dead recorded, and any other points observed which may prove of value.

The author gratefully acknowledges the notes and assistance of Professor H. D. Reed, Dr. A. H. Wright, Mr. L. A. Fuertes and Mr. John Vann, as well as the hearty co-operation of Mr. H. H. Knight, with whom many of the accompanying photographs were taken.

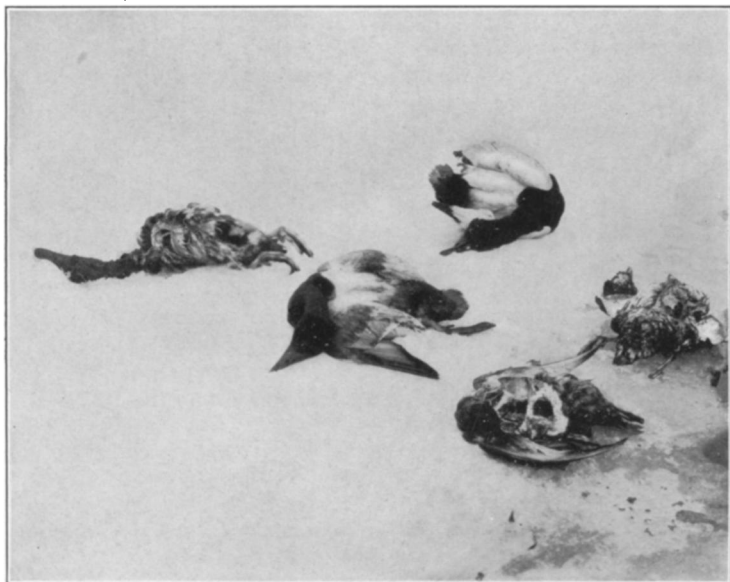
1. **Colymbus holboelli.** HOLBOELL'S GREBE.—The freezing of Cayuga Lake offered a rare opportunity for a study of this most interesting and apparently little known bird. Until the present time, the Holboell's Grebe has been considered only a rare visitant at the southern end of the

lake,¹ one or two being recorded almost every winter. It has proved, however, to be the predominant grebe during this winter, twenty-eight individuals having been taken. The reason of its unprecedented abundance here is undoubtedly to be found in the six weeks of extremely cold weather, and the consequent closure of waters in other regions. The sudden closing of the lake's surface in one night left these birds in an absolutely helpless condition, since open water is a necessity for taking flight in this group of birds, Holbøell's Grebe being no exception to the rule. As a result, eleven beautiful specimens were picked up alive from the ice in perfectly good physical condition. If approached while sitting on the ice, these birds made no attempt to escape. They would strike at the outstretched hand, and would emit calls very loon-like in general quality. Once the bird alights upon the ice, it is unable to take flight, and must await starvation or other tragic end. At best, all it can do is to flap its wings and possibly scrape along over the ice for a few feet. The position of the legs, together with the smooth surface of the ice, rendered these efforts at locomotion entirely futile. The best opportunity of observing this bird occurred in a little piece of open water in Fall Creek, below Ithaca Falls. This hole was about twenty-five feet square, shallow at one end and deep at the other, surrounded on three sides by thin ice, and on the fourth by ice sufficiently strong to afford good footing. The bird had apparently alighted in the pool, and even here there was insufficient open water for taking flight again, and it was therefore possible to study the actions of this bird at very close range. When approached, the bird dove, and remained under water nearly a minute. As soon as it came up, it would dive again on the instant so long as the observer remained near. The water was clear, and the bird could be seen plainly, shooting and zigzagging about, midway between the surface and the bottom. While swimming under water, the neck is extended to its utmost, and both legs and wings are used. With neck outstretched, the bird offers the least possible resistance to the water, there being a smooth and gradual transition from the tip of the slender bill to the middle of the back, the widest part of the body. The speed which is developed under water is marvelous, at times it being almost impossible to follow its movements, which were so rapid that the bird appeared more like a large, gray fish darting about. When coming to the surface, the bill and head appeared slowly, when a glimpse of the observer caused it to dive again. In diving, even though the body was under water, the bill went down first, so that it really dove instead of sinking quietly. After having been under water almost continually for over fifteen minutes, the bird was tired out, and finally came to the surface on the opposite side of the pond from the observer. Here, it drifted nervously about, giving its peculiar squawking note every few seconds. After being watched for some time, it was driven into the

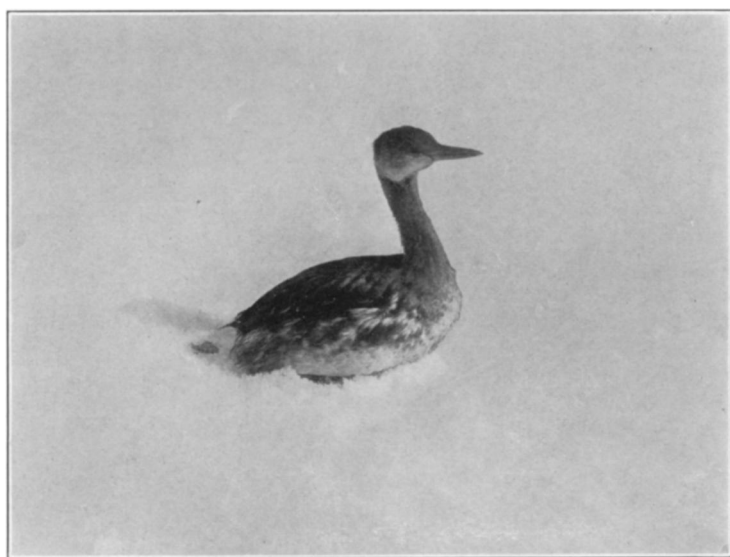
¹ Reed & Wright. *The Vertebrate Fauna of the Cayuga Lake Basin, N. Y.*, p. 409.



CANVAS-BACKS RISING.



1. DEAD SCAUP DUCKS AND CANVAS-BACKS.



2. HOLBOELL'S GREBE STRANDED.

shallower water, where it suddenly dove and remained down over a minute. It reappeared finally over two hundred feet away, crawling upon the thin ice through a hole which it had made with its head and bill. The bird was taken from the ice without a struggle or attempt to escape. The other ten living specimens were picked up from the ice on the lake proper, far from any open water.

The stomach contents of the specimens that were found dead were examined and proved interesting, as in each case the sole material found proved to be a ball of feathers.¹ Both the feathers and the inner wall of the gizzard were stained a deep and brilliant emerald green, so that when the contents were removed they appeared to be a mass of dried *Algæ*. Several of the feathers were dried, after having been thoroughly cleansed, and were identified as coming from the belly of the Grebe itself. There is room for a great deal of conjecture as to the significance of these feathers in the gizzard. All the birds examined were fat, and had died probably as a result of severe exposure, rather than of starvation. Mr. L. A. Fuertes tells me that the gizzards of the various species of grebes found in this country, which he has examined, have invariably contained a few, and in some specimens, quite a ball of feathers. The green coloring matter proved to be bile. The presence of this bile in the gizzard is another interesting point, a condition due possibly to abstinence from food, as it was present in the case of every bird examined, and present in such abundance as to be very noticeable. There are records, then, of eleven living birds that were captured. Besides these, in the area between Ludlowville and the south end of the lake, seventeen specimens were found dead upon the ice, making a total of twenty-eight birds for eight square miles, and undoubtedly there were some of which nothing is known. The Holboell's Grebe, because of its highly specialized form, probably suffered the most of all the birds upon the lake, and few, if any, escaped.

The vitality of these birds is truly remarkable. As the lake froze on the 10th, the birds had their last possible chance to feed on that date. A male, the only one which showed signs of the red neck, which was taken on the 12th, died on the 28th without having eaten during its captivity. In marked contrast to the other specimens, this bird showed no trace of fat, and instead of weighing 2.5 lbs., which was the average of those that died of exposure, it weighed a scant 1.25 lbs. The average measurements of four birds were: length, 20 in.; extent, 30.8 in.; wing, 7.5 in.; bill along gape, 2.8 in.; tarsus, 2.5 in. Average weight, 2.5 lbs.

2. **Colymbus auritus.** HORNED GREBE.—None of these birds were seen alive, but there are records of three found dead upon the ice. All three specimens had been greatly damaged by crows and gulls.

3. **Podilymbus podiceps.** PIED-BILLED GREBE.—A single dead specimen was found frozen in the ice near the east shore, on the third day after the freezing.

¹ Eifrig, C. W. G. Notes on Some Northern Birds. Auk, XXIII, July, 1906, pp. 314-315.

4. **Larus argentatus.** HERRING GULL.—There was one flock of forty-one Herring Gulls which spent six days within this limited area. Contrary to their usual habits, these birds remained constantly on the ice, and took to the air reluctantly when approached closely. One interesting point was noted which showed the gulls to be hard pressed for food; there were great numbers of "Saw-bellies" (*Pomolobus pseudoharengus*) frozen in the ice at a depth of from three to eight inches. Above those that were nearest the surface, the ice was found to be pecked, showing where the gulls had attempted to reach the fish. One bird was actually seen while thus occupied. No deaths are recorded among the gulls, due, no doubt, to the abundance of dead ducks upon the ice.

5. **Mergus americanus.** MERGANSER.—A number of females were encountered in the Inlet, and two pair were constantly seen in Fall Creek. They appeared not to suffer at all for lack of food, and I often watched them dive under the ice, and remain under for a period ranging from one to two minutes. No dead were found.

6. **Anas rubripes.** BLACK DUCK.—During the first days of the migration, quite a number of these birds were seen, but they were exceedingly wild, and approach was impossible. A flock of approximately one hundred inhabited the water hole at Ludlowville, but the moment they were startled, they rose and flew over the ice, when they lit, and where they remained for the most part until twilight. At dusk they returned to the hole. The Black Ducks did not suffer at all for want of food, as more than once they were found in a field of Alfalfa, two miles from the lake. No deaths are reported.

7. **Marila americana.** REDHEAD.—Numerous flocks were encountered daily, but they were smaller in size than the flocks of the other species, and more wary. Only one small flock of seven allowed me to approach within forty feet of them before they took to wing, after which they rose to a considerable height, and were soon lost in the distance. At another time one of these birds was watched while standing within thirty feet of it, as it swam around in the Inlet in company with a Bluebill and a Golden-eye. This particular bird was a female, and of the three, was by far the most lively. It was she that led them up stream a few yards, and when they finally rose, she took the lead. The Redheads probably suffered very little, though why any particular species should suffer more or less than another, would be difficult to say. Personally, I did not find a single dead Redhead, but there are reports of two having been found.

8. **Marila valisineria.** CANVAS-BACK.—The Canvas-back was second to the Bluebill in abundance. When found they were in small flocks of from three to thirty, but over one hundred inhabited the Ludlowville pool. The numerous flocks were small in size. Not a day passed but that upward of fifty Canvas-backs were seen in flocks averaging ten or fifteen. These ducks suffered, to all appearances, as much as any species on the lake. A flock of twenty-two was approached to within thirty feet one afternoon before they gave any heed, but finally they rose heavily and flew low over

the ice a distance of sixty yards, where they lit, and immediately assumed a resting posture. Two of these ducks were captured alive, both being taken almost as easily as one would take an apple from the ground. The first made one feeble flight when approached, but that was all. He was followed and picked up off the ice without a struggle. The second was taken from the ice without having made any attempt to fly. The condition of both of these birds was pitiful, to say the least. Hardly able to stand erect, and too feeble to mind what was going on around them, they sat on the ice in a more or less dazed condition. The feathers were unpreened, and those of the breast and belly were yellow and matted with grease. Both of these birds were found on the ice of Fall Creek. There are records of twenty-two Canvas-backs that were found dead within this area. Allowing for those that were missed, it is highly probable that these eight miles held about twenty-eight dead of this species, the per cent of mortality being greater than in any other species. By the small pool of open water at Ludlowville, three dead Canvas-backs, together with two dead Bluebills, were found, as shown in the photograph. (Plate XX, Fig. 1). The stomachs examined contained nothing but pebbles, averaging 14.5 grams in weight. These ducks were woefully thin, being, in very truth, nothing but "skin and bones."

9. **Marila marila.** SCAUP DUCK, BLUEBILL.—The most abundant duck seen on the lake during this period was the Bluebill. As a general rule, these birds were found in flocks of various sizes, ranging from a few individuals to four hundred, but single birds were found in the open water of the various streams tributary to the lake. The largest flock seen was just off Portland Point. This flock was discovered at rest upon the ice, and so close together were they, and so numerous, that the birds gave the appearance of a solid black line, and it was not until one had approached to within one hundred yards of them that one could be sure that it was indeed a flock of ducks. The birds were quite indifferent to being approached, and it was not until one was within two hundred feet of them that they showed any signs of uneasiness. When within one hundred feet, they rose slowly and flew some little distance down the lake, where they settled once more into their compact formation. It was not until they rose that one realized that there were easily over four hundred ducks in the flock. It was all but impossible for these birds to rise clear of the ice. The indifference shown toward unguarded approach, the reluctance with which they rose, the short distance which they flew, in fact, their every action bespoke exhaustion and weakness. In a small piece of open, rapidly flowing water in Fall Creek, a female of this species was caught by hand, without difficulty. The bird, too exhausted even to try to fly, could make no headway against the current, and was therefore easily captured. It was too weak to eat, and died within twenty-four hours. Two peculiar incidents with regard to Bluebills have been brought to my notice. One specimen was found while still alive, in which over half the webbing of both feet had been frozen and dropped off. Another was found frozen in a

cake of ice, with nothing but the head and about half the neck protruding from the mass. The duck, still alive, was chopped out, when it was found that the ice had in some way frozen over the duck, leaving water next to the body. This was undoubtedly kept from freezing by the action of the legs and the body heat. The bird was uninjured, and after being fed, seemed little the worse for its experience. In all, nineteen dead Bluebills were found upon the ice of the lake, within six miles of Ithaca, and reports coming from various points along the lake, seem to indicate a rather uniform mortality throughout the entire area. The specimens examined were extremely thin. There was no trace of fat on the bodies, and the breast bones were barely covered by flesh. The stomachs contained nothing whatsoever, while in the gizzards were found small quantities of gravel averaging 13.45 grams in weight.

10. ***Clangula clangula americana***. GOLDEN-EYE.—Golden-eyes were encountered daily, although they were less numerous than any of the preceding species of ducks. When seen they were usually in flocks of from twenty to forty, but only a few flocks were seen each day. Usually it was impossible to approach within fifty feet of these birds, although in one instance a flock of a dozen individuals was watched from a considerably shorter distance than this. A beautiful male specimen was picked up in the same manner as the Canvas-backs were captured, and with as little resistance. To all external appearances he was perfect, yet his body was a sad contrast to his brilliant plumage. There are records of five dead Golden-eyes found within the six miles studied. As with the other ducks, the gizzards contained only pebbles, but in smaller quantities, averaging 8.5 grains in weight.

11. ***Charitonetta albeola***. BUFFLE-HEAD.—A single male specimen of this species remained constantly in the open water at Ludlowville, and even with stones could not be driven out. It seemed to thrive well on the corn it found scattered there, and was absolutely fearless of human presence. This was the only specimen seen.